SECRET PRIORITY

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S E C R E T 212257Z FEB 68 CITE [redacted] 3072 25X1
PRIORITY [redacted] 25X1
OXCART 1968 FEB 22 00 06Z
REF [redacted] 6003 25X1
SUBJ: BAROMETRIC ALTITUDE, MISSION 68T004

1

SEVEN FRAMES FROM MISSION 68T004 WERE SELECTED FOR AN ANALYSIS TO DETERMINE THE ACCURACY OF BAROMETRIC ALTITUDE AS RECORDED BY THE SC AND DM. FRAME SELECTION WAS BASED ON THE DISTRIBUTION OF READILY IDENTIFIED CONTROL POINTS IN THE PHOENIX TEST RANGE IMAGERY. A SPACE RESECTION TECHNIQUE EMPLOYING LEAST SQUARES ADJUSTMENT WAS USED TO COMPUTE THE CAMERA STATION COORDINATES (INCLUDING ALTITUDE ABOVE MEAN SEA LEVEL) WHICH BEST FIT THE MEASURED POINTS. THE PERTINENT RESULTS ARE LISTED AS TABLE A. THE GROUND DISTANCES BETWEEN THE CONTROL POINTS WERE ALSO COMPUTED UTILIZING THE EXISTING MATH MODEL WITH THE APPROPRIATE INS DATA (INCLUDING CORRECTED BARAMETRIC ALTITUDE) AS INPUT. THE RELATIVE ERRORS ARE LISTED AS TABLE B. THE RELATIVELY SMALL DIFFERENCES BETWEEN THE RESECTED AND CORRECTED BAROMETRIC ALTITUDES AND THE PLUS OR MINUS ONE PERCENT (TWO SIGMA) ACCURACY OF THE COMPUTED DIMENSIONS SHOW THAT THE BAROMETRIC ALTITUDE

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1	File	25X1
2	Cable Sec.	
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	IAS	
	DIAXX-4	
	SPAD	
	[redacted]	25X1
	DIA-AP	

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AS RECORDED ON MISSION 68T004 IS QUITE SATISFACTORY FOR MENSURATION PURPOSES. A FAVORABLE COMPARISON OF THE COMPUTED CAMERA ATTITUDE (A BY-PRODUCT OF THE SPACE RESECTION) TOGETHER WITH THE ACCURACY OF THE COMPUTED DIMENSIONS SHOW THAT BOTH THE VEHICLE ATTITUDE AND CAMERA ATTITUDE AS RECORDED ON MISSION 68T004 ARE ALSO SATISFACTORY FOR MENSURATION PURPOSES.

2. GROUND DIMENSIONS WERE COMPUTED FROM IMAGERY OBTAINED ON TEST MISSIONS 67T173 AND 67T208 WHICH COVERED THE [redacted] SURVEYED RANGE. THE RELATIVE ERRORS AND MISSION DATA ARE LISTED IN TABLES C AND D RESPECTIVELY. AS SHOWN IN THE RESULTS, THE CONSISTENTLY NEGATIVE VALUES INDICATE THAT THE ERRORS ARE DUE TO SCALE FACTORS, I. E., FOCAL LENGTH OR ALTITUDE ERRORS. COMPUTING OVER LONG DISTANCES SERVED TO MINIMIZE ERRORS DUE TO MEASUREMENT, FILM SHRINKAGE, LENS DISTORTION, ETC. THE RELATIVELY LARGE AVERAGE ERROR NEGATES A MAJOR CONTRIBUTION FROM FOCAL LENGTH SINCE THE ERROR WOULD HAVE TO BE OF A MAGNITUDE WHICH WOULD SEVERELY DEGRADE THE IMAGERY. THE SAME CAMERA (UNIT 1) WAS USED ON MISSIONS 68T004 AND 67T173, SINCE THE FORMER MISSION WITH A VERIFIED ALTITUDE YIELDED GOOD RESULTS WHILE THE LATTER MISSION (ASSUMING A RELATIVELY CONSTANT FOCAL LENGTH) RESULTED IN LARGER ERRORS, THE ALTITUDE AS

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RECORDED ON 67T173 CAN BE CONSIDERED TO BE IN ERROR BY APPROXIMATELY 2 PERCENT OR 1,500 FEET. BASED ON THE ASSUMPTION THAT THE FOCAL LENGTH DOES NOT GREATLY CONTRIBUTE TO MENSURATION ERRORS, THE ALTITUDE AS RECORDED ON MISSION 67T208 WAS THEN IN ERROR BY APPROXIMATELY 3 PERCENT OR 2,200 FEET. A SPACE RESECTION WAS NOT PERFORMED FOR THE TWO MISSIONS BECAUSE THE DISTRIBUTION OF THE CONTROL POINT IMAGES WAS NOT FAVORABLE FOR A STRONG SOLUTION.

3. TO SUMMARIZE THIS ANALYSIS, THE RESULTS FROM MISSION 68T004 SHOW THAT THE EXISTING MATH MODEL IS A VALID REPRESENTATION OF THE SYSTEM; THAT THE CORRECTED BAROMETRIC ALTITUDE WAS ACCURATE TO

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LESS THAN ONE PERCENT OF TRUE ALTITUDE (TWO SIGMA); AND THAT THE ATTITUDE AND OTHER RECORDED DATA WERE SATISFACTORY FOR MENSURATION PURPOSES. NO MAJOR CHANGES TO THE PARTICULAR CONFIGURATION (VEHICLE, CAMERA, RECORDERS, ETC) CAN BE RECOMMENDED AS A RESULT OF THIS ANALYSIS. TO OBTAIN MORE DATA FOR FURTHER STUDY, SECOND TEST FLIGHT SHOULD BE EXECUTED.

TABLE A

FRAME NUMBER	MODE ANGLE (DEGREES)	POINTS ON FRAME	BAROMETRIC ALTITUDE (CORRECTED)	ALTITUDE BY RESECTION	PERCENT ERROR
241	17.5	8	78080	77570	0.7

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251	0.0	3	78080	77975	0.1
254	0.0	3	77980	77920	0.1
516	0.0	7	80410	80700	-0.4
519	0.0	6	80510	80740	-0.3
522	0.0	6	80510	80740	-0.3
525	0.0	5	80610	80650	0.0

AVERAGE -0.1
ST. DEV. 0.37

TABLE B

FRAME	MAX PERCENT ERROR	MIN PERCENT ERROR
241	-1.1	0.7
251	0.1	0.0
254	0.2	0.1
516	-1.1	-0.3
519	$0.9	0.2
525	$0.5	0.2

($ DENOTES PLUS SIGN)
AVERAGE $0.09
ST. DEV. 0.50 PERCENT

25X1

TABLE C

MISSION 67T208

FRAME	MODE ANGLE	MAX PERCENT ERROR	MIN PERCENT ERROR
3296	-17.5	-3.6	-3.3
3299	0.0	-2.9	-2.7
3300	-17.5	-3.4	-2.9
3301	-33.0	-3.6	-3.0
3303	0.0	-3.2	-2.2
3304	-17.5	-3.0	-2.4

AVERAGE -2.9 PERCENT
STD. DEV. 0.41 PERCENT

MISSION 67T173

FRAME	MODE ANGLE	MAX PERCENT ERROR	MIN PERCENT ERROR
611	33.0	-2.7	-2.1
612	17.5	-3.1	-2.9
613	0.0	-3.0	-2.0
616	17.5	-2.7	-1.8
617	0.0	-2.3	-1.5

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619 33.Ø -2.6 -1.5
AVERAGE -2.2 PERCENT
ST. DEV. Ø.52 PERCENT

TABLE D
THE FOLLOWING IS A TABLE SHOWING THE CHARACTERISTICS OF THESE THREE MISSIONS:

MISSION NUMBER	68TØØ4	67T173	67T2Ø8
TAPE NUMBER	1	1	3
VEHICLE	132	13Ø	131
CAMERA NUMBER	1	1	3
INS PACKAGE	H14EØ1	HØ8JØ7	H17JØ6
RECORDER	GØ8GØ9	GØ1FØ2	GØ5GØ9
CONTROL RANGE			

25X1

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END OF MSG